

Serial No.10/632,311
HP Docket No: 200208136-1

REMARKS

This communication is in response to the Office Action dated June 25, 2005. Claims 1-29 are pending in the present Application. Claims 14-20 have been allowed. Claims 1-6, 8-12, 14-19, 21-24 and 26-28 are rejected. Claims 7, 13, 20, 25 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

102 Rejections

Claims 1, 8, 14, 21 and 26

For ease of review, Applicant reproduces independent claims 1, 8, 14 and 21 herein below:

1. A method for dynamically controlling cooling resources in a data center comprising:
 - determining a workload within the data center;
 - determining an amount of heat being generated as a function of the workload; and
 - activating each of a plurality of different types of cooling resources within the data center in an optimal fashion based on the heat being generated.
8. A system for dynamically controlling cooling resources in a data center comprising:
 - means for determining a workload within the data center;
 - means for determining an amount of heat being generated as a function of the workload; and
 - means for activating each of a plurality of different types of cooling resources coupled within the data center in an optimal fashion based on the amount of heat being generated.
14. A data center comprising:

Serial No.10/632,311
HP Docket No: 200208136-1

a global computer system;
a plurality of different cooling resources coupled to the global computer system; and
a cooling resource control module coupled to the global computer system and the plurality of different cooling resources wherein the cooling resource control module includes logic for:
determining a workload within the global computer system;
determining an amount of heat being generated as a function of the workload; and
activating each of a plurality of different types of cooling resources coupled to the global computer system in an optimal fashion based on the amount of heat being generated.

21. A computer program product for dynamically controlling cooling resources in a global computer system, the computer program product comprising a computer usable medium having computer readable program means for causing a computer to perform the steps of:

determining a workload within the global computer system;
determining an amount of heat being generated as a function of the workload; and
activating each of a plurality of different types of cooling resources coupled to the global computer system in an optimal fashion based on the amount of heat being generated.

26. A cooling resource control module for a data center comprising:
determination logic for:
determining a workload within the data center; and
determining an amount of heat being generated as a function of the workload; and
activation logic for activating each of a plurality of different types of cooling resources within the data center in an optimal fashion based on the amount of heat being generated.

The Examiner states:

Claims 1-6, 8-12, 14-19, 21-24 and 26-28 are rejected under 35 USC §102(e) as being anticipated by Friedrich et al. (US 2003/0193777).

Applicant respectfully disagrees. The present invention includes a method and system for dynamically controlling cooling resources in a data center. The present invention dynamically controls a plurality of different types of cooling

Serial No. 10/632,311
HP Docket No: 200208136-1

resources within a data center based on the workload constraints (power consumed, latency, etc.) of the data center. Accordingly, each of the plurality of different types of cooling resources is activated in an optimal fashion based on the workload constraints. As a result of the use of the method and system in accordance with embodiments of the present invention, a substantial savings in operational costs related to cooling resources is achieved.

Claim 1 recites a method for dynamically controlling cooling resources in a data center that includes determining a workload within the data center, determining an amount of heat being generated as a function of the workload and *activating each of a plurality of different types of cooling resources* within the data center in an optimal fashion based on the heat being generated. (Emphasis added.)

The Examiner states that the Friedrich reference anticipates the present invention. Applicant respectfully disagrees and asserts that the Friedrich reference does not disclose *activating each of a plurality of different types of cooling resources within the data center in an optimal fashion* based on the heat being generated as recited in claim 1 of the present invention. Friedrich discloses an energy management system for one or more computer data centers, including a plurality of racks containing electronic packages. The electronic packages may be one or a combination of components such as, processors, micro-controllers, high-speed video cards, memories, semi-conductor devices, computers and the like. The energy management system includes a system controller for distributing

Serial No. 10/632,311
HP Docket No: 200208136-1

workload among the electronic packages. The system controller is also configured to manipulate cooling systems within the one or more data centers.

Applicant asserts that Friedrich reference only relates to the performance of calculations to determine a most energy efficient workload-to-cooling arrangement. *Friedrich does not teach or suggest the step of activating each of a plurality of different types of cooling resources within the data center in an optimal fashion based on the heat being generated.* The Examiner stipulates that Friedrich teaches this step in paragraph 33. Paragraph 33 of Friedrich reads:

After determining the energy utilization of the servers 112a, 112e, 112h and 112m, the system controller 130 may determine an optimal workload-to-cooling arrangement. The optimal workload-to-cooling arrangement may be one in which energy utilization is minimized, or one in which energy cost are minimized. In this example, the energy utilization is to be minimized, therefore the system controller 130 performs calculations to determine the most energy efficient workload-to-cooling arrangement.

Applicant fails to see how this paragraph demonstrates the step of activating each of a plurality of different types of cooling resources within the data center in an optimal fashion based on the heat being generated as recited in the present invention. The cooling system of the present invention includes a plurality of different types of cooling resources. For example, in an embodiment of the present invention, a first type of cooling resource is an air-based cooling resource, a second type of cooling resource is a liquid-based cooling resource and a third type of cooling resource is a gas-based cooling resource. *The Friedrich reference does not disclose the implementation of a plurality of different cooling resources as recited in the independent claims of the present invention.*

Furthermore, claim 2 recites an embodiment whereby the optimal fashion

Serial No.10/632,311
HP Docket No: 200208136-1

is based on a cost associated with the activation of each of the plurality of different cooling resources. *Friedrich does not teach or suggest an optimal fashion based on a cost associated with the activation of each of the plurality of different cooling resources.* The Examiner stipulates that Friedrich teaches this step in paragraph 33. Paragraph 33 is shown above.

Although Friedrich discloses cooling optimization to minimize energy utilization or to minimize energy costs, Applicant fails to see how this paragraph demonstrates that an optimal fashion of activating each of a plurality of different cooling resources is based on a cost associated with the activation of each of the plurality of different cooling resources.

Consequently, since the Friedrich reference does not disclose the implementation of a plurality of different cooling resources, Friedrich does not disclose the step of activating each of a plurality of different types of cooling resources within the data center in an optimal fashion based on the heat being generated as recited in the independent claims of the present invention. Accordingly, independent claims 1, 8, 14, 21 and 26 of the present invention are allowable over the Friedrich reference.

Claims 2-6, 9-12, 15-19, 22-24 and 27-28

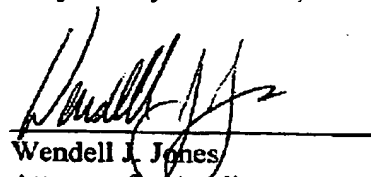
Since claims 2-6, 9-12, 15-19, 22-24 and 27-28 are respectively dependent on claims 1, 8, 14, 21 and 26, the above-articulated arguments with regard to independent claims 1, 8, 14, 21 and 26 apply with equal force to claims 2-4, 6, 9-

Serial No. 10/632,311
HP Docket No: 200208136-1

10, 22-24 and 27-28. Accordingly, claims 2-4, 6, 9-10, 22-24 and 27-28 should be allowed over the Examiner's cited reference.

Applicant believes that this application is in condition for allowance. Accordingly, Applicant respectfully requests reconsideration, allowance and passage to issue of the claims as now presented. Should any unresolved issues remain, Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Wendell J. Jones", is written over a horizontal line.

Wendell J. Jones
Attorney for Applicant
Reg. No. 45,961
(408) 938-0980